

### In the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims

1. (Currently amended) A method for ~~checking whether~~ improving a neural network prediction for an input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data; the prediction being based on whether the input data record is in a working range of a neural network, the input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data, wherein the working range is defined by the a convex envelope formed by training input data records of the neural network, comprising the following steps:
  - (a) storing training input data records for the neural network, forming ~~[[a]]~~ the convex envelope by means of the training input data records,
  - (b) checking whether the input data record is in the convex envelope, in
    - (i) selecting a number ( $d + 1$ ) of non-collinear points from the set of training input records,
    - (ii) forming a first simplex ( $S_1$ ) from the selected points,
    - (iii) selecting a point ( $x_l$ ) from the interior of the first simplex ( $S_l$ ),
    - (iv) ~~definition of~~ defining a path between the input data record and the selected point,
    - (v) checking whether there is an intersection point ( $x_{l+1}$ ) between the path and a facet of the first simplex, and
    - (vi) checking whether a second simplex ( $S_{l+1}$ ) which contains the intersection point and a section of the path can be formed from the number of points from the training input data records~~[[.]]~~ ,
  - (c) delivering result that input data record is inside or outside the working range of the used neural network through confirming that the input data is respectively

inside or outside the convex envelope; and

(d) improving the neural network prediction by disregarding the input data record if it is outside the working range of the used neural network and processing by the used neural network the input data record if it is inside the working range.

2. (Canceled)

3. (Previously presented) The method according to Claim 1, further comprising the steps for checking whether a second simplex may be formed:

- (vii) determining vertices of a facet of the first simplex on which the intersection point is located,
- (viii) selecting a further, non-collinear point from the training input data records,
- (ix) forming a simplex ( $S''$ ) from the vertices and the further point,
- (x) checking whether the simplex contains a section of straight line, and outputting the simplex as a second simplex, if this is the case,
- (xi) exchanging the further point for another, non-collinear point from the set of training input data records and renewed checking.

4. (Canceled)

5. (Previously presented) The method according to Claim 11, wherein a minimum of  $F$  being searched for in order to check whether a hyper-plane exists, where

$$F = -\min \left( \frac{k \cdot r_i}{|k|} \right)$$

and where the hyper-plane is represented by the normal vector  $k$  and  $r_i = p_i - x$ , where  $x$  is the point defined by the input data record.

6. (Canceled)

7. (Canceled)

8. (Currently amended) A system for ~~determining whether~~ improving a neural network prediction for an input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data; the prediction being based on whether the input data record is in a working range of a neural network, ~~the input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data~~, wherein the working range is defined by ~~the~~ a convex envelope formed by training input data records of the neural network, comprising

at least one neural network which has been trained using a set of training input data records,

(d) improving the neural network prediction by disregarding the input data record that is outside the working range of the used neural network so only the input data record that is inside the working range is processed by the used neural network.

means for ~~checking whether one of~~ improving the neural network prediction by checking the input data record relative to the convex envelope which is formed by the training input data records; disregarding the input data record if it for the neural network is in outside the convex envelope which is formed by the training input data records and processing by the used neural network the input data record if it is inside the convex envelope,

a hybrid model which contains at least a first neural network and a second neural network, the first neural network having been trained using a set of first training input data records, and the second neural network having been trained using a set of second training input data records, the ~~checking~~ improving means being embodied in such a way that for a first input data record for the first neural network it is checked whether the first input data record is in the convex envelope which is formed by the first training input data records, and that it is checked for a second input data record for the second neural network whether the second input data record is in the convex envelope which is formed by the second training input data records, the

assignment of the first input data record to the first neural network and the assignment of the second input data record to the second neural network being carried out in automated fashion from a composite data record.

9. (Original) The system according to Claim 8, wherein the checking means being embodied in such a way that the checking is carried out in accordance with a method according to Claim 1.

10. (Original) A computer digital storage medium program product for carrying out a method according to Claim 1.

11. (Currently amended) A method for ~~checking whether~~ improving a neural network prediction for an input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data; the prediction being based on whether the input data record is in a working range of a neural network, ~~the input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data, wherein the~~ working range is defined by ~~the~~ a convex envelope formed by training input data records of the neural network, comprising the following steps:

(a) storing training input data records for the neural network, forming ~~[[a]]~~ the convex envelope by means of the training input data records,

(b) checking whether the input data record is in the convex envelope, in checking whether there is a hyper-plane which contains the input data record so that all the training input data records are located on one side of the hyper-plane.

(c) delivering a result that input data record is within or without the working range of used neural network through confirming that the input data is respectively inside or outside the convex envelope; and

(d) improving the neural network prediction by disregarding the input data record if it is outside the working range of the used neural network and processing by the used neural network the input data record if it is inside the working range.

12. (Currently amended) A method for checking whether improving a neural network prediction for an input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data; the prediction being based on whether the input data record is in a working range of a neural network, the input data record being manufacturing process data selected from the group comprising data related to the materials used, composition data, parameters of the production system, pressure data and/or temperature data, and wherein the working range is defined by the a convex envelope formed by training input data records of the neural network, comprising the following steps:

(a) storing training input data records for the neural network, forming ~~[[a]]~~ the convex envelope by means of the training input data records,

(b) checking whether the input data record is in the convex envelope, in

(i) selecting an initial vector  $\lambda^{(0)} = (\lambda_1, \dots, \lambda_n)$  with  $\lambda_1 + \dots + \lambda_n = 1$  and  $\lambda_j \geq 0$  ( $j=1, \dots, n$ ), where preferably  $\lambda_j = \frac{1}{n}$  is selected,

(ii) selecting a matrix  $M$  in such a way that the lines matrix  $\hat{P}^{(i)} := M \cdot P^{(i)}$  are orthonormal,

(iii) calculating  $\lambda = \lambda^{(i)} + \hat{P}^{(i)T} \cdot (\hat{x} - \hat{x}^{(i)})$ , where  $\hat{x}^{(i)} := \hat{P}^{(i)} \lambda^{(i)}$ ,

(iv) checking whether all  $\lambda_j \geq 0$  (for  $j=1, \dots, n$ ),

(v) deleting all components from the matrix  $P^{(i)}$  and from the vector  $\lambda^{(i)}$ , which infringe the secondary condition  $\lambda_j \geq 0$  (for  $j=1, \dots, n$ ),

(vi) renewing calculating of  $\lambda$ , and

(c) delivering result that input data record is within or without the working range of used neural network through confirming that the input data is respectively inside or outside the convex envelope; and

(d) improving the neural network prediction by disregarding the input data record if it is outside the working range of the used neural network and processing by the used neural network the input data record if it is inside the working range.